Report on the 2002 KBIX Field Test

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National Severe Storms Laboratory

Final Report

Task 4.1

FY 2002 Memorandum of Understanding Between
Radar Operations Center
and
National Severe Storms Laboratory

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Executive Summary

During April-June 2002, the Keesler Air Force Base WSR-88D KBIX was employed to collect radar data using a set of proposed new volume coverage patterns (VCPs) that are faster and denser at lower elevation angles than the currently operational VCPs. Data collection was controlled from Norman, OK and the data were recorded in Norman.

This field test was successful in spite of a number of equipment and communication malfunctions that arose throughout the test. Data were collected on a total of 54 days; on 10 of the days severe storms occurred within the KBIX coverage area. In a follow-on study, output from storm algorithms using the new VCPs with KBIX will be compared with output from the same algorithms using current VCPs from the three operational WSR-88Ds surrounding KBIX.

1. Introduction

During the past several years, it has become increasingly difficult to have access to the Radar Operations Center's (ROC) testbed radar KCRI or the National Severe Storms Laboratory's (NSSL) developmental KOUN radar to test algorithm performance using new volume coverage patterns (VCPs). In early 2002, the WSR-88D at Keesler Air Force Base (KBIX) near Biloxi, Mississippi was transferred from the U. S. Air Force to the National Weather Service (NWS). Knowing that there would be a period of at least six months before the radar would be disassembled and moved to the Jackson, MS forecast office, the ROC made arrangements for the radar to be used for VCP testing. With the availability of KBIX, it was possible to test algorithm performance using the VCPs on data collected outside of Oklahoma.

The primary purpose of the field test was to reduce risks associated with the operational implementation of the new VCPs. The test was slated to start on 26 March and continue through 31 May 2002, but it was extended through 30 June in order to collect additional data for no additional expense. Seven experimental VCPs were tested: VCP Alpha (VCP 55), VCP Beta (VCPs 56 and 57), VCP Gamma (VCPs 53 and 77), VCP Delta (VCP 61 and 62), VCP Epsilon (VCP 45), VCP Zeta (VCP 46), and VCP 44. For those VCPs that have two numbers in parentheses, the second number is an updated version that was changed midway through the test; elevation angles remained the same, but the number of pulses at lower elevation angles were increased and/or the number of radials per sweep were adjusted to try to achieve an optimal count of slightly over 360. Details about the VCPs are given in Appendix A.

NSSL was tasked to assist the ROC Applications Branch in writing the field test plan, assist with the staffing of the Control Center in Norman during significant weather events, install and maintain some of the hardware and telecommunications equipment, and prepare this final report on the field test. Randy Steadham (ROC APP Branch) provided valuable assistance in the preparation of this report and Christina Horvat (ROC ENG Branch) provided information about the bandwidth utilization tests that she conducted.

2. Preparation for Field Test

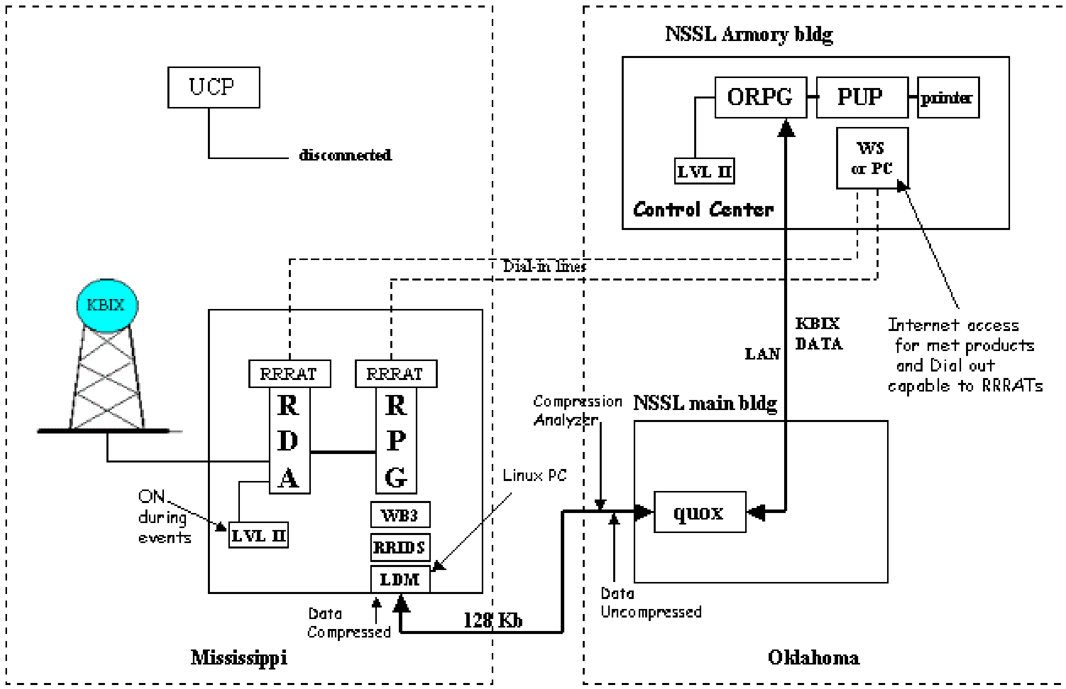
The ROC Applications Branch was in charge of preparing for and managing the project. In collaboration with NSSL scientists, the ROC Test Manager prepared a detailed Test Plan. The main components of the Test Plan are discussed throughout this report. Field test hardware, communication lines, software installation, and administrative support were performed or sponsored by ROC personnel and NSSL technicians. Agreements and responsibilities related to the field test were established among agency administrators representing the National Weather Service (NWS), NEXRAD Department of Defense (DOD), Keesler AFB, the NSSL, and the ROC.

Maintenance of hardware and software for the KBIX WSR-88D during the test was a ROC responsibility. In preparation for the test, repairs were made to inoperative parts of the radar system and antenna alignment was checked. Also, updated clutter suppression maps were prepared. A full system software load was performed on the KBIX Radar Data Acquisition (RDA) and Radar Product Generator (RPG) computers, including specifications for the new VCPs (see Appendix A).

In order to control the KBIX radar from a control center in Norman, Oklahoma, and to transmit Level II data from Biloxi to Norman, an inexpensive but functional network configuration was devised (Fig. 1). Proven communication hardware and software solutions were utilized. For instance, the Radar Interface Data Distribution System (RIDDS), developed by NSSL to distribute base data to external users, was positioned in the network between a KBIX RPG wideband 3 port and Unidata Local Data Manager (LDM) that was used to compress data. The relatively inexpensive network configuration allowed remote control of the radar and delivered base data hundreds of miles from origin; however, occasional failures were experienced.

The arrangement of field test equipment had several unique characteristics. The commercial digital telephone line had less bandwidth than a typical line carrying Level II data. Since data flowing across the telephone line were compressed, it was felt that the commercial line would be adequate. To confirm that the capacity of data along the line was sufficient for new VCPs, data analyzers were monitored.

The legacy RPG at Biloxi operated with Build 10 software but delimiters were set



Keesler Configuration for the New VCP Field Test

Figure 1

to eliminate unnecessary processes such as product distribution and algorithm execution.
Unlike

a typical operational RPG, the KBIX RPG had only two primary functions with regard to
the

field test. One function was to transmit Level II data received from the RDA. The other function was to send, upon command, new volume coverage patterns to the RDA.

From the KBIX shelter, compressed Level II data were transmitted along a commercial 128 kilobyte per second digital telephone line to a router located at the Radar Operations Center. At this point in the network, a data analyzer was connected to allow the flow of compressed data to be monitored. The data were uncompressed and sent through a T1 line to the Quox Workstation in the NSSL main building. The workstation distributed Level II data onto the NSSL Local Area Network (LAN) and to a dedicated ORPG in the field test control center located within the NSSL armory building.

The ORPG initial software load was Mini Build xpid version 1.999 dated 14 December 2001. Adaptation data files that defined VCPs were replaced with updated files defining legacy and new VCPs. The Multiple Pulse Repetition Frequency Dealiasing Algorithm (MPDA) software was installed on the ORPG. Base data originating from MPDA VCPs were processed with the MPDA. Base data from non-MPDA VCPs were processed with the legacy dealiasing algorithm. A JAZ drive and an 8mm tape recorder were connected to the ORPG to record Level III and Level II data, respectively. Products from the ORPG were sent to a non-associated PUP through a 14.4 kilobyte per second narrowband communication line. The PUP included the standard dual display with graphics tablet, an applications terminal, system console, and printer. RDA/RPG Remote Access Terminal (RRRAT) equipment, a PC based platform, was used to control the KBIX RPG and the KBIX RDA, accessing the Unit Control Position (UCP) and the RDA Man-Machine Interface position. The RRRAT was used to download new VCPs from the RPG to the RDA and to manipulate the KBIX WSR-88D.

Volunteer observers were recruited from the ROC, NSSL, and the Warning Decision Training Branch (WDTB) to staff the Control Center on days with severe weather in the KBIX coverage area. The observers volunteered to be available for one or more weeks during the field test (see Appendix B). Jami Boettcher (WDTB) trained the observers how to use the PUP and how to load the appropriate RPS list (see Appendix C) for the VCP being used. Prior to the beginning of the field test, dry run operations were conducted to familiarize observers with the procedures.

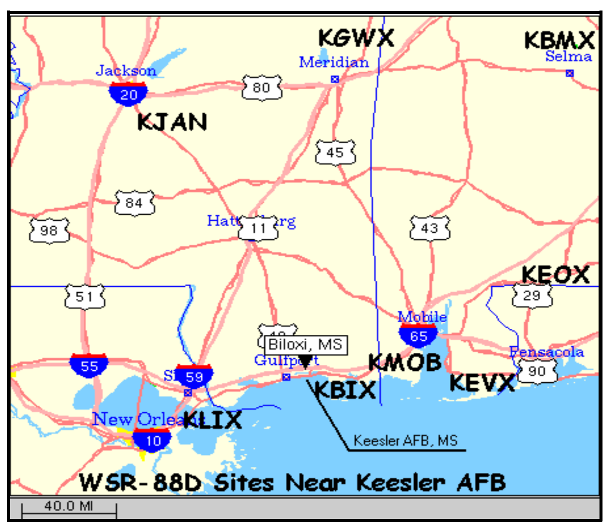


Figure 2. Location of KBIX relative to surrounding WSR-88Ds (KLIX, KJAN, KMOB).

Arrangements were made for forecasters at the Jackson, MS Weather Forecast Office (WFO) to participate in the field test by archiving Level II data from the three nearby WSR-88Ds at Jackson, MS (KJAN), Mobile, AL (KMOB), and New Orleans / Slidell, LA (KLIX) (see Fig. 2). Periodically during the field test, the Jackson WFO staff mailed the data tapes to the ROC Applications Branch. Algorithms and products derived from these legacy VCPs will be compared with algorithms and products derived from new VCPs used on KBIX.

3. Conduct of the Field Test

Level II KBIX radar data were continuously recorded at the Control Center whenever the radar was operational. When severe weather or heavy precipitation events were expected within the KBIX WSR-88D umbrella, a "Test Day" was declared and observers were present in the Control Center. Observers had a checklist of routine duties that they could follow (see Appendix D). The duties primarily consisted of making sure that all of the pieces of equipment were functioning properly and that VCPs were changed as the weather situation evolved. Equipment problems were recorded on log sheets (see Appendix E) and the appropriate technician was notified. There also were logs for recording when Level II tapes were changed (see Appendix F) and when VCPs were changed (see Appendix G). When interesting phenomena were observed on the PUP display, the observations were recorded (see Appendix H) and prints were made from the display. The observations were especially important when it was time to decide which data sets should be studied.

The type of VCP used was determined by weather type and weather location. The chart in Appendix I indicates the process used to decide which VCP should be used. Based on experience gained, midway through the test VCPs 57, 62, and 77 were added as refined versions of VCPs 56, 61, and 53, respectively. When no precipitation was occurring, the radar used VCP 55 (Alpha). When severe weather and/or heavy precipitation was occurring near the radar, the discretion of the radar observer and the surveillance need determined use of VCP 56/57 (Beta), VCP 53/77 (Gamma), or VCP 61/62 (Delta). For distant or shallow precipitation, VCP 56/57 (Beta) was used. At the close of a Test Day, when weather was no longer severe or storms were distant, the radar observer would leave the radar running using an MPDA VCP (VCPs 44, 45, or 46). Before leaving the Control Center, the volunteer labeled and packaged the worksheets and logs.

Listed in Appendix J are the daily numbers of volume scans collected using the various VCPs during the course of the test. A total of 8938 volume scans were collected. Nearly half of them were collected using VCP 56. About 2000 volumes were collected using VCP 77. Only a few volume scans were collected using VCPs 55, 61, and 62.

Between 200 and 800 volumes were collected for remaining VCPs 44, 45, 46, 53, and 57.

An important part of this field test was to monitor bandwidth utilization for the compressed data that were transmitted from KBIX to the ROC (where the data were uncompressed before being sent to the Control Center). Christina Horvat (ROC ENG) reports that VCP 53/77 (Gamma), which is the first new VCP likely to be added to the operational WSR-88Ds, can be transmitted without requiring additional bandwidth (see Appendix K). However, it appears that the MPDA VCPs 44, 45 (Epsilon), and 46 (Zeta), as well as fast VCP 61/62 (Delta), would require the availability of broader bandwidth before they could be implemented into the system.

A variety of technical problems surfaced over the three-month period of the field test. Some of the problems were brief and sporadic while a few impacted the test for longer periods. Only one component of the planned network, an archive Level II jukebox in the KBIX shelter, never successfully operated. The jukebox was expected to function as a backup to data collection. A replacement unit and several repair efforts did not provide the capability to collect the backup Level II data.

A problem arose with the collection of data using VCPs 61 and 62. After two completed scans, the data stopped flowing to the ORPG. The data was continuing to be generated at the RDA and transferred to NSSL's Quox Workstation. The solution to this problem was to command the radar to use a legacy VCP (such as 11 or 21) before restarting in one of the new VCPs.

Of the sporadic technical problems, the most frequent was related to a workstation configured to distribute base data onto the NSSL LAN. The workstation was not protected from power outages, data distribution software would core dump (possibly due to missed radials), and NSSL employees not directly involved with the field test had the only physical and electronic access to the workstation. Without the timely assistance from these NSSL employees, less favorable field test results would have resulted. Some outages of the test network became inevitable on weekends and after business hours when the workstation failed to distribute Level II data to the Control Center.

There were other intermittent but less frequent difficulties with the test network.

Power outages both at Norman and at Biloxi were most often caused by thunderstorms. Some components in the network were protected with uninterruptible power sources but others were not. Regular telephone line services were disrupted at times which disabled RRRAT control to the KBIX RPG and RDA. Other RRRAT failures were experienced during the field test owing to PC failures and operator error. If, during an operator session, a RRRAT connection was improperly closed, the modem located 800 miles away would no longer await subsequent calls. The solution was to call personnel at Keesler AFB and request a favor to reboot the computer.

Network outages ranging from a day to several days were sometimes the result of single major component failures. A hard disk drive unit in the KBIX RPG had to be replaced. During another instance, the air conditioner that cooled computer equipment in the KBIX shelter became inoperative, forcing a shut down of WSR-88D equipment. Also, the air conditioner that cooled the small room housing PUP computers at the Control Center frosted over. The overheated room caused PUP software to crash. On 10 June commercial service to the 128K digital communications line was disrupted for unknown reasons.

Some technical difficulties persisted for substantial periods of the test. A particularly troublesome problem, missing radials in the base data, was discovered early but the cause was not identified until mid-May. The missed radials degraded the quality of Level II data collected at the Control Center. After much conjecture the problem was suspected to be lack of memory in the LDM PC at KBIX. The missed radial problem ceased when memory in the LDM PC was increased from 28 to 96 Mb on 22 May. Another problem surfacing a few weeks before the test ended was failure of the JAZ drive used to collect Level III data.

Flaws in the characteristics of some of the new VCPs were discovered early in the test. That is, radial counts, unrelated to the missing radials problem, for some cuts generated from new VCPs were insufficient in number. Changes to radial counts in the new VCPs were made in the adaptation data parameters by redefining azimuthal scan rate and/or pulse counts. On 28 May the new adaptation data file containing corrections to the new VCPs was loaded on the KBIX RPG.

The network configuration was an inexpensive way to accomplish the objectives of the field test. Several lessons were learned in the process of working with the unique configuration. If a similar field test is planned in the future, it would be advantageous to include dedicated personnel to provide rapid repairs for all potential failure points in the network. In addition, a redundant way to archive Level II data had been a good idea, but the failure of this recording capability resulted in the loss of important data. The narrowband communication rate should possess a bandwidth sufficient to alleviate loadshedding, especially when using fast VCPs.

4. Plans for Data Analysis

Analyses of the data collected during the successful KBIX field test are being conducted under Task 4.3 of the current ROC-NSSL Memorandum of Understanding. Comparisons of algorithm outputs will be undertaken for those storms that are roughly equidistant between KBIX using the new VCPs and one or more of the surrounding WSR-88Ds (KLIX, KJAN, KMOB) using the legacy VCPs. The algorithms being investigated are the Tornado Detection Algorithm, Mesocyclone Detection Algorithm, Hail Detection Algorithm, Storm Cell Identification and Tracking Algorithm, Vertically Integrated Liquid Algorithm, and the Composite Reflectivity Algorithm.

The following days have tentatively been identified for study based on (a) severe weather reports within the KBIX coverage area and (b) data being collected by the KBIX radar:

8 April 2002	Tornado, Hail, Wind
29 April 2002	Hail, Wind
30 April 2002	Tornado, Hail, Wind
3 May 2002	Wind
9 May 2002	Hail
17 May 2002	Hail, Wind
30 May 2002	Wind
4 June 2002	Wind
19 June 2002	Wind
20 June 2002	Hail, Wind

The final selection of data sets will depend on the availability of roughly equidistant data from at least one of the three surrounding WSR-88Ds.

Appendix A

New Volume Coverage Patterns Used During the Test

The characteristics of the new volume coverage patterns (VCPs) used during the field test are tabulated on the following pages. The tabulated VCPs and their intended applications are:

VCP Alpha (VCP 55)	Clear Air Mode (short pulse)
VCP Beta (VCPs 56 & 57)	Shallow or Distant Convection
VCP Gamma (VCPs 53 & 77)	Deep Convection
VCP Delta (VCP 61 & 62)	Fast Evolution
VCP Epsilon (VCP 45)	Deep Convection - MPDA
VCP Zeta (VCP 46)	Fast Evolution - MPDA
VCP 44 (similar to VCP 21)	MPDA

MPDA is the Multiple PRF (Pulse Repetition Frequency) Dealiasing Algorithm. The Greek letters are the generic names for the VCPs whose applications are indicated on the right. VCPs 57, 77, and 62 are updated versions of VCPs 56, 53, and 61, respectively, that transmit more pulses at the lower elevation angles. These updates were made midway through the field test after monitoring how the VCPs were performing.

VOLUME COVERAGE PATTERN 44 (MPDA version of VCP 21)

Scan				Surveillance		Doppler PRF No.				
Elevation (deg)	**AZ Rate (deg/sec)**	**Period (sec)**	**WF Type**	**PRF No.**	**No Pulses**	**4 No. Pulses**	**5 No. Pulses**	**6 No. Pulses**	**7 No. Pulses**	**8 No. Pulses**
0.5	28.851	12.48	CS	1	11	-	-	-	-	-
0.5	29.400	12.25	CD	8	-	29	34	37	40	43
0.5	26.994	13.34	CD	6	-	-	-	40	-	-
0.5	21.128	17.04	CD	4	-	40	-	-	-	-
1.45	28.851	12.48	CS	1	11	-	-	-	-	-
1.45	29.400	12.25	CD	8	-	29	34	37	40	43
1.45	26.994	13.34	CD	6	-	-	-	40	-	-
1.45	21.128	17.04	CD	4	-	40	-	-	-	-
2.4	19.205	18.75	B	1,8	6	27	32	34	37	40
2.4	26.994	13.34	CD	6	-	-	-	40	-	-
2.4	21.128	17.04	CD	4	-	40	-	-	-	-
3.35	22.083	16.30	B	2,8	6	27	31	34	37	40
3.35	26.994	13.34	CD	6	-	-	-	40	-	-
3.35	21.128	17.04	CD	4	-	40	-	-	-	-
4.3	19.776	18.20	B	2,7	6	31	37	40	43	46
6.0	21.556	16.70	B	3,7	6	31	37	40	43	46
9.9	27.489	13.10	CD	8	-	31	36	39	42	46
14.6	27.489	13.10	CD	8	-	31	36	39	42	46
19.5	27.489	13.10	CD	8	-	31	36	39	42	46

Default Doppler PRF numbers are underscored

VOLUME COVERAGE PATTERN 45 (Deep Convection - MPDA)

Scan				Surveillance		Doppler PRF No.				
Elevation (deg)	AZ Rate (deg/sec)	Period (sec)	WF Type	PRF No.	No Pulses	4 No. Pulses	5 No. Pulses	6 No. Pulses	7 No. Pulses	8 No. Pulses
0.5	28.800	12.50	CS	1	11	-	-	-	-	-
0.5	28.800	12.50	CD	8	-	29	34	37	40	44
0.5	26.640	13.50	CD	6	-	32	38	40	43	47
0.5	24.000	15.00	CD	4	-	35	42	45	48	53
1.3	28.800	12.50	CS	1	11	-	-	-	-	-
1.3	28.800	12.50	CD	8	-	29	34	37	40	44
1.3	26.640	13.50	CD	6	-	32	38	40	43	47
1.3	24.000	15.00	CD	4	-	35	42	45	48	53
2.1	29.220	15.50	B	1 - 8	3	27	32	35	38	41
2.1	26.640	13.50	CD	6	-	32	38	40	43	47
2.1	24.000	15.00	CD	4	-	35	42	45	48	53
2.9	22.500	16.00	B	2 - 5	2	33	40	43	46	50
3.8	22.500	16.00	B	2 - 5	2	33	40	43	46	50
4.8	22.500	16.00	B	3 - 5	3	33	39	43	46	50
6.1	22.500	16.00	B	3 - 5	3	33	39	43	46	50
7.7	29.400	12.25	CD	7	-	28	34	36	39	43
9.7	29.400	12.25	CD	7	-	28	34	36	39	43
12.2	29.400	12.25	CD	7	-	28	34	36	39	43
15.5	29.400	12.25	CD	7	-	28	34	36	39	43
19.5	29.400	12.25	CD	7	-	28	34	36	39	43

Default number of pulses is underscored

VOLUME COVERAGE PATTERN 46 (Fast Evolution - MPDA)

Scan				Surveillance		Doppler PRF No.				
Elevation (deg)	AZ Rate (deg/sec)	Period (sec)	WF Type	PRF No.	No Pulses	4 No. Pulses	5 No. Pulses	6 No. Pulses	7 No. Pulses	8 No. Pulses
0.5	28.800	12.50	CS	1	11	-	-	-	-	-
0.5	28.800	12.50	CD	8	-	29	34	37	40	44
0.5	26.640	13.50	CD	6	-	32	38	40	43	47
0.5	24.000	15.00	CD	4	-	35	42	45	48	53
1.3	28.800	12.50	CS	1	11	-	-	-	-	-
1.3	28.800	12.50	CD	8	-	29	34	37	40	44
1.3	26.640	13.50	CD	6	-	32	38	40	43	47
1.3	24.000	15.00	CD	4	-	35	42	45	48	53
2.3	23.22	15.50	B	1	4	25	29	32	34	37
2.3	26.640	13.50	CD	6	-	32	38	40	43	47
2.3	24.000	15.00	CD	4	-	35	42	45	48	53
4.0	23.46	15.33	B	3	3	32	38	41	44	48
6.5	23.46	15.33	B	3	3	32	38	41	44	48

Default number of pulses is underscored

VOLUME COVERAGE PATTERN 53 (Deep Convection)

Scan				Surveillance		Doppler PRF No.				
Elevation (deg)	**AZ Rate (deg/sec)**	**Period (sec)**	**WF Type**	**PRF No.**	**No Pulses**	**4 No. Pulses**	**5 No. Pulses**	**6 No. Pulses**	**7 No. Pulses**	**8 No. Pulses**
0.5	21.000	17.10	CS	1	15	-	-	-	-	-
0.5	24.000	15.00	CD	-	-	35	41	45	48	52
0.9	21.000	17.10	CS	1	15	-	-	-	-	-
0.9	24.000	15.00	CD	-	-	35	41	45	48	52
1.3	27.000	13.30	B	1	3	22	26	28	31	33
1.8	27.000	13.30	B	2	3	25	29	32	34	37
2.4	27.000	13.30	B	3	3	27	32	34	37	40
3.2	27.000	13.30	B	3	3	27	32	34	37	40
4.0	27.000	13.30	B	3	3	27	32	34	37	40
5.1	28.800	12.50	B	3	3	25	30	32	34	37
6.4	28.800	12.50	CD	-	-	29	34	37	40	44
8.0	28.800	12.50	CD	-	-	29	34	37	40	44
10.0	28.800	12.50	CD	-	-	29	34	37	40	44
12.5	28.800	12.50	CD	-	-	29	34	37	40	44
15.6	28.800	12.50	CD	-	-	29	34	37	40	44
19.5	28.800	12.50	CD	-	-	29	34	37	40	44

Default number of pulses is underscored

VOLUME COVERAGE PATTERN 55 (Clear Air)

Scan				Surveillance		Doppler PRF No.				
Elevation (deg)	**AZ Rate (deg/sec)**	**Period (sec)**	**WF Type**	**PRF No.**	**No Pulses**	**4 No. Pulses**	**5 No. Pulses**	**6 No. Pulses**	**7 No. Pulses**	**8 No. Pulses**
0.50	8.812	40.85	CS	1	36	-	-	-	-	-
0.50	7.867	45.76	CD	-	-	107	127	137	148	161
0.90	8.812	40.85	CS	1	36	-	-	-	-	-
0.90	7.867	45.76	CD	-	-	107	127	137	148	161
1.30	8.812	40.85	CS	1	36	-	-	-	-	-
1.30	7.867	45.76	CD	-	-	107	127	137	148	161
1.80	7.109	50.64	B	2	6	107	127	137	148	161
2.30	7.109	50.64	B	2	6	107	127	137	148	161
2.80	7.109	50.64	B	2	6	107	127	137	148	161
3.40	7.109	50.64	B	2	6	107	127	137	148	161
4.10	7.109	50.64	B	2	6	107	127	137	148	161
4.90	7.109	50.64	B	2	6	107	127	137	148	161

Default number of pulses is underscored

VOLUME COVERAGE PATTERN 56 (Shallow Convection)

Scan				**Surveillance**		**Doppler PRF No.**				
Elevation (deg)	**AZ Rate (deg/sec)**	**Period (sec)**	**WF Type**	**PRF No.**	**No Pulses**	**4 No. Pulses**	**5 No. Pulses**	**6 No. Pulses**	**7 No. Pulses**	**8 No. Pulses**
0.50	20.580	17.50	CS	1	15	-	-	-	-	-
0.50	20.580	17.50	CD	5	-	41	49	53	57	62
0.90	20.580	17.50	CS	1	15	-	-	-	-	-
0.90	20.580	17.50	CD	5	-	41	49	53	57	62
1.30	17.160	21.00	B	1	3	39	47	50	54	59
1.80	17.160	21.00	B	2	4	39	47	50	54	59
2.30	17.160	21.00	B	2	4	39	47	50	54	59
2.80	17.160	21.00	B	2	4	39	47	50	54	59
3.40	17.160	21.00	B	2	4	39	47	50	54	59
4.10	17.160	21.00	B	2	4	39	47	50	54	59
4.90	17.160	21.00	B	2	4	39	47	50	54	59
5.80	17.160	21.00	B	2	4	39	47	50	54	59
6.80	17.160	21.00	B	2	4	39	47	50	54	59
8.10	17.160	21.00	B	2	4	39	47	50	54	59

Default number of pulses is underscored

VOLUME COVERAGE PATTERN 57

Scan				Surveillance		Doppler PRF No.				
Elevation (deg)	**AZ Rate (deg/sec)**	**Period (sec)**	**WF Type**	**PRF No.**	**No Pulses**	**4 No. Pulses**	**5 No. Pulses**	**6 No. Pulses**	**7 No. Pulses**	**8 No. Pulses**
0.5	19.831	18.15	CS	1	16	-	-	-	-	-
0.5	20.402	17.65	CD	5	-	41	<u>49</u>	53	57	62
0.9	19.831	18.15	CS	1	16	-	-	<u>40</u>	-	-
0.9	20.402	17.65	CD	5	-	41	<u>49</u>	53	57	62
1.3	16.502	21.82	B	1,5	4	39	<u>46</u>	50	54	59
1.8	17.425	20.66	B	2,5	5	38	<u>45</u>	49	53	57
2.3	17.425	20.66	B	2,5	5	38	<u>45</u>	49	53	57
2.8	17.425	20.66	B	2,5	5	38	<u>45</u>	49	53	57
3.4	17.425	20.66	B	2,5	5	38	<u>45</u>	49	53	57
4.1	17.425	20.66	B	2,5	5	38	<u>45</u>	49	53	57
4.9	17.425	20.66	B	2,5	5	38	<u>45</u>	49	53	57
5.8	17.425	20.66	B	2,5	5	38	<u>45</u>	49	53	57
6.8	17.425	20.66	B	2,5	5	38	<u>45</u>	49	53	57
8.1	17.326	20.78	B	2,7	5	38	45	49	<u>53</u>	58

Default Doppler PRF numbers are underscored

VOLUME COVERAGE PATTERN 61 (Fast Evolution)

Scan				Surveillance		Doppler PRF No.				
Elevation (deg)	**AZ Rate (deg/sec)**	**Period (sec)**	**WF Type**	**PRF No.**	**No Pulses**	**4 No. Pulses**	**5 No. Pulses**	**6 No. Pulses**	**7 No. Pulses**	**8 No. Pulses**
0.5	28.800	12.50	CS	1	11	-	-	-	-	-
0.5	28.800	12.50	CD	-	-	29	<u>34</u>	37	40	44
0.9	28.800	12.50	CS	1	11	-	-	-	-	-
0.9	28.800	12.50	CD	-	-	29	<u>34</u>	37	40	44
1.5	28.800	12.50	CS	1	11	-	-	-	-	-
1.5	28.800	12.50	CD	-	-	29	<u>34</u>	37	40	44
2.5	23.220	15.50	B	1	2	28	<u>33</u>	36	39	42
4.1	23.220	15.50	B	2	3	28	<u>34</u>	36	39	43
6.5	23.220	15.50	B	3	6	28	<u>33</u>	36	39	42

Default number of pulses is underscored

VOLUME COVERAGE PATTERN 62

Scan				Surveillance		Doppler PRF No.				
Elevation (deg)	**AZ Rate (deg/sec)**	**Period (sec)**	**WF Type**	**PRF No.**	**No Pulses**	**4 No. Pulses**	**5 No. Pulses**	**6 No. Pulses**	**7 No. Pulses**	**8 No. Pulses**
0.5	28.851	12.48	CS	1	11	-	-	-	-	-
0.5	28.554	12.61	CD	5	-	29	<u>35</u>	38	41	44
0.9	28.851	12.48	CS	1	11	-	-	-	-	-
0.9	28.554	12.61	CD	5	-	29	<u>35</u>	38	41	44
1.5	28.851	12.48	CS	1	11	-	-	-	-	-
1.5	28.554	12.61	CD	5	-	29	<u>35</u>	38	41	44
2.5	22.787	15.80	B	1,5	3	28	<u>33</u>	36	39	42
4.1	24.489	14.70	B	2,5	3	29	<u>34</u>	36	39	43
6.5	23.555	15.28	B	3,5	3	28	<u>33</u>	36	39	42

Default Doppler PRF numbers are underscored

VOLUME COVERAGE PATTERN 77

Scan				Surveillance		Doppler PRF No.				
Elevation (deg)	**AZ Rate (deg/sec)**	**Period (sec)**	**WF Type**	**PRF No.**	**No Pulses**	**4 No. Pulses**	**5 No. Pulses**	**6 No. Pulses**	**7 No. Pulses**	**8 No. Pulses**
0.5	18.675	19.38	CS	1	17	-	-	-	-	-
0.5	19.224	18.83	CD	-	-	44	<u>52</u>	56	61	66
0.9	19.844	18.24	CS	1	16	-	-	-	-	-
0.9	19.225	18.83	CD	-	-	44	<u>52</u>	56	61	66
1.3	27.000	13.30	B	1	3	22	<u>26</u>	28	31	33
1.8	27.000	13.30	B	2	3	25	<u>29</u>	32	35	38
2.4	27.000	13.30	B	3	3	27	<u>32</u>	34	37	40
3.2	27.000	13.30	B	3	3	27	<u>32</u>	34	37	40
4.0	27.000	13.30	B	3	3	27	<u>32</u>	34	37	40
5.1	28.800	12.50	B	3	3	25	<u>30</u>	32	34	37
6.4	28.800	12.50	CD	-	-	29	34	<u>37</u>	40	44
8.0	28.800	12.50	CD	-	-	29	34	<u>37</u>	40	44
10.0	28.800	12.50	CD	-	-	29	34	<u>37</u>	40	44
12.5	28.800	12.50	CD	-	-	29	34	<u>37</u>	40	44
15.6	28.800	12.50	CD	-	-	29	34	<u>37</u>	40	44
19.5	28.800	12.50	CD	-	-	29	34	<u>37</u>	40	44

Default number of pulses is underscored

Appendix B

Schedule of Volunteer Observers

start date	finish date	radar observer (volunteer)
26 March	1 April 2002	Janelle Janish (NSSL), Jami Boettcher (WDTB)
2 April	8 April 2002	Jim LaDue (WDTB), Joe Baalke (WDTB)
9 April	15 April 2002	Robert Lee (APP), Liz Quoetone (WDTB)
16 April	22 April 2002	Don Rinderknecht (WDTB)
23 April	29 April 2002	Bim Wood (NSSL), Zittel & May (APP)
30 April	6 May 2002	Randy Steadham(APP)
7 May	13 May 2002	Randy Steadham(APP),John Ferree (WDTB)
14 May	20 May 2002	Bim Wood (NSSL), Brad Grant (WDTB)
21 May	27 May 2002	Rodger Brown (NSSL),Zittel & May (APP)
28 May	3 June 2002	Rodger Brown (NSSL),Zittel & May (APP)
4 June	30 June 2002	Randy Steadham(APP)

Appendix C

RPS Lists
(Prepared by Jami Boettcher)

A. Clear Air....VCP 55 (Alpha)

B. Shallow Convection / Distant Storms....VCPs 56 and 57 (Beta)

C. Deep Convection / Close Storms....VCPs 53 and 77 (Gamma)

D. Fast Evolution (Delta)....VCP 61 and 62 (Delta)

E. MPDA with Legacy Tilts....VCP 44 (same tilts as VCP 21)

F. Deep Convection MPDA....VCP 45 (Epsilon)

G. Fast Evolution MPDA....VCP 46 (Zeta)

Letter: A

Title: Clear Air

VCP: 55 (Alpha)

Used For: Clear air surveillance.

Products

VCP 55 (Alpha) RPS List									
	Name	data lvl	Resolution	elev-lyr		Name	data lvl	Resolution	elev-lyr
1	R	16	1.1	0.5	20	R	16	0.54	2.8
2	R	16	0.54	0.5	21	V	16	0.54	2.8
3	V	16	0.13	0.5	22	SRM	16		2.8
4	V	16	0.27	0.5	23	R	16	0.54	3.4
5	V	16	0.54	0.5	24	V	16	0.54	3.4
6	SRM	16		0.5	25	SRM	16		3.4
7	R	16	0.54	0.9	26	R	16	0.54	4.1
8	V	16	0.13	0.9	27	V	16	0.54	4.1
9	V	16	0.54	0.9	28	SRM	16		4.1
10	SRM	16		0.9	29	R	16	0.54	4.9
11	R	16	0.54	1.3	30	V	16	0.54	4.9
12	V	16	0.54	1.3	31	SRM	16		4.9
13	SRM	16		1.3	32	CR	16	0.54	
14	R	16	0.54	1.8	33	LRM			Med
15	V	16	0.54	1.8	34	STI			
16	SRM	16		1.8	35	STP			
17	R	16	0.54	2.3	36	VIL			
18	V	16	0.54	2.3	37	VWP			
19	SRM	16		2.3					

Letter: B

Title: Shallow Convection / Distant Storms

VCP: 56 and 57 (Beta)

Used For: General use during stratiform and distant convective weather events.

Products

VCPs 56 and 57 (Beta) RPS List									
	Name	data lvl	Resolution	elev-lyr		Name	data lvl	Resolution	elev-lyr
1	R	16	1.1	0.5	25	SRM			4.8
2	R	16	0.54	0.5	26	R	16	0.54	5.8
3	V	16	0.27	0.5	27	SRM			5.8
4	V	16	0.54	0.5	28	R	16	0.54	6.8
5	SRM			0.5	29	SRM			6.8
6	R	16	1.1	0.9	30	R	16	0.54	8.1
7	R	16	0.54	0.9	31	SRM			8.1
8	V	16	0.54	0.9	32	CR	16	1.1	
9	SRM			0.9	33	LRM			Low
10	R	16	1.1	1.3	34	LRM			Med
11	R	16	0.54	1.3	35	LRM			Hi
12	V	16	0.54	1.3	36	LRA			Low
13	SRM			1.3	37	LRA			Med
14	R	16	0.54	1.8	38	LRA			Hi
15	SRM			1.8	39	STI			
16	R	16	0.54	2.3	40	SS			
17	SRM			2.3	41	STP			
18	R	16	0.54	2.8	42	OHP			
19	SRM			2.8	43	VIL			
20	R	16	0.54	3.4	44	HI			
21	SRM			3.4	45	ET			
22	R	16	0.54	4.1	46	M			
23	SRM			4.1	47	TVS			
24	R	16	0.54	4.8	48	VWP			

Letter: C

Title: Deep Convection / Close Storms

VCP: VCPs 53 and 77 (Gamma)

Used For: Severe convective storms. Designed to be applicable for NWS warning situations. At lowest elevation cut RPS provides all resolutions of velocity and reflectivity products. RPS provides numerous tilts of reflectivity, velocity, and SRM products from lowest to highest elevation cuts.

Products

VCPs 53 and 77 (Gamma) RPS List

	Name	data lvl	Resolution	elev-lyr		Name	data lvl	Resolution	elev-lyr
1	R	16	1.1	0.5	26	SRM			8.0
2	R	16	0.54	0.5	27	R	16	0.54	10.0
3	V	16	0.13	0.5	28	SRM			10.0
4	V	16	0.27	0.5	29	R	16	0.54	12.5
5	V	16	0.54	0.5	30	SRM			12.5
6	SRM			0.5	31	R	16	0.54	15.6
7	R	16	0.54	0.9	32	SRM			15.6
8	V	16	0.54	0.9	33	R	16	0.54	19.5
9	SRM			0.9	34	CR	16	0.54	
10	R	16	0.54	1.3	35	LRM			Low
11	V	16	0.54	1.3	36	LRM			Med
12	SRM			1.3	37	LRM			Hi
13	R	16	0.54	1.8	38	LRA			Low
14	SRM			1.8	39	LRA			Med
15	R	16	0.54	2.4	40	LRA			Hi
16	SRM			2.4	41	STI			
17	R	16	0.54	3.2	42	SS			
18	SRM			3.2	43	STP			
19	R	16	0.54	4.0	44	OHP			
20	SRM			4.0	45	VIL			
21	R	16	0.54	5.1	46	HI			
22	SRM			5.1	47	M			
23	R	16	0.54	6.4	48	TVS			
24	SRM			6.4	49	VWP			
25	R	16	0.54	8.0	50	ET			

Letter: D

Title: Convective Storm - Rapid Evolution

VCP: 61 and 62 (Delta)

Used For: Rapidly evolving severe convective storms. Designed to be applicable for NWS warning situations. RPS places heavy emphasis upon base data and storm relative velocity products used to determine first signatures of tornadoes and convective wind events.

Products

VCP 61 and 62 (Delta) RPS List									
	Name	data lvl	Resolution	elev-lyr		Name	data lvl	Resolution	elev-lyr
1	R	16	0.54	0.5	22	R	16	0.54	4.1
2	R	16	1.1	0.5	23	SRM			4.1
3	V	16	0.13	0.5	24	R	16	0.54	6.5
4	V	16	0.27	0.5	25	SRM			6.5
5	V	16	0.54	0.5	26	CR	16	0.54	
6	SRM			0.5	27	LRM			Low
7	R	16	0.54	0.9	28	LRM			Med
8	R	16	1.1	0.9	29	LRM			Hi
9	V	16	0.13	0.9	30	LRA			Low
10	V	16	0.27	0.9	31	LRA			Med
11	V	16	0.54	0.9	32	LRA			Hi
12	SRM			0.9	33	STI			
13	R	16	0.54	1.5	34	SS			
14	R	16	1.1	1.5	35	STP			
15	V	16	0.13	1.5	36	OHP			
16	V	16	0.27	1.5	37	VIL			
17	V	16	0.54	1.5	38	HI			
18	SRM			1.5	39	M			
19	R	16	0.54	2.5	40	TVS			
20	R	16	1.1	2.5	41	VWP			
21	SRM			2.5	42	ET			

Letter: E

Title: Multiple PRF Dealiasing Algorithm (MPDA)

VCP: 44

Used For: Resolving Range Folding of improver dealiased velocity values, especially with severe convective storms. Designed to match lowest elevation cuts with legacy VCPs for research purposes. RPS places emphasis upon base velocity products.

Products

MPDA VCP 44 (same tilts as VCP 21) RPS List									
	Name	data lvl	Resolution	elev-lyr		Name	data lvl	Resolution	elev-lyr
1	R	16	1.1	0.5	26	SRM			6.0
2	R	16	0.54	0.5	27	R	16	0.54	9.9
3	V	16	0.13	0.5	28	SRM			9.9
4	V	16	0.27	0.5	29	R	16	0.54	14.6
5	V	16	0.54	0.5	30	SRM			14.6
6	SRM			0.5	31	R	16	0.54	19.5
7	R	16	1.1	1.5	32	SRM			19.5
8	R	16	0.54	1.5	33	CR	16	1.1	
9	V	16	0.13	1.5	34	LRM			Low
10	V	16	0.27	1.5	35	LRM			Med
11	V	16	0.54	1.5	36	LRM			Hi
12	SRM			1.5	37	LRA			Low
13	R	16	0.54	2.4	38	LRA			Med
14	V	16	0.27	2.4	39	LRA			Hi
15	V	16	0.54	2.4	40	STI			
16	SRM			2.4	41	SS			
17	R	16	0.54	3.4	42	STP			
18	V	16	0.27	3.4	43	OHP			
19	V	16	0.54	3.4	44	VIL			
20	SRM			3.4	45	HI			
21	R	16	0.54	4.3	46	ET			
22	V	16	0.13	4.3	47	M			
23	V	16	0.54	4.3	48	TVS			
24	SRM			4.3	49	VWP			
25	R	16	0.54	6.0					

Letter: F

Title: MPDA VCP 45 - Deep Convection

VCP: 45 (Epsilon)

Used For: Resolving Range Folding of improver dealiased velocity values, especially with severe convective storms. Designed to closely match elevation cuts of VCP 53 (Gamma). RPS places emphasis upon base velocity products.

Products

MPDA VCP 45 (Epsilon) RPS List

	Name	data lvl	Resolution	elev-lyr		Name	data lvl	Resolution	elev-lyr
1	R	16	1.1	0.5	26	SRM	16		6.1
2	R	16	0.54	0.5	27	R	16	0.54	7.7
3	V	16	0.13	0.5	28	SRM	16		7.7
4	V	16	0.27	0.5	29	R	16	0.54	9.7
5	V	16	0.54	0.5	30	SRM			9.7
6	SRM	16		0.5	31	R	16	0.54	12.2
7	R	16	0.54	1.3	32	SRM			12.2
8	V	16	0.13	1.3	33	SRM			15.5
9	V	16	0.27	1.3	34	CR	16	0.54	
10	V	16	0.54	1.3	35	LRM			Low
11	SRM	16		1.3	36	LRM			Med
12	R	16	0.54	2.1	37	LRM			Hi
13	V	16	0.13	2.1	38	LRA			Low
14	V	16	0.27	2.1	39	LRA			Med
15	V	16	0.54	2.1	40	LRA			Hi
16	SRM	16		2.1	41	STI			
17	R	16	0.54	2.9	42	SS			
18	V	16	0.54	2.9	43	STP			
19	SRM			2.9	44	OHP			
20	R	16	0.54	3.8	45	VIL			
21	V	16	0.54	3.8	46	HI			
22	SRM			3.8	47	ET			
23	R	16	0.54	5.8	48	M			
24	SRM			5.8	49	TVS			
25	R	16	0.54	6.1	50	VWP			

Letter: G

Title: MPDA VCP 46 - Fast Evolution

VCP: 46 (Zeta)

Used For: Resolving Range Folding of improver dealiased velocity values, especially with severe convective storms. Designed to closely match elevation cuts of VCP 61 (Delta). RPS places emphasis upon base velocity products.

Products

MPDA VCP 46 (Zeta) RPS List

	Name	data lvl	Resolution	elev-lyr		Name	data lvl	Resolution	elev-lyr
1	R	16	1.1	0.5	22	R	16	0.54	5.8
2	R	16	0.54	0.5	23	SRM			5.8
3	V	16	0.13	0.5	24	R	16	0.54	6.1
4	V	16	0.27	0.5	25	CR	16	0.54	
5	V	16	0.54	0.5	26	LRM			Low
6	SRM	16		0.5	27	LRM			Med
7	R	16	0.54	1.3	28	LRM			Hi
8	V	16	0.13	1.3	29	LRA			Low
9	V	16	0.27	1.3	30	LRA			Med
10	V	16	0.54	1.3	31	LRA			Hi
11	SRM	16		1.3	32	STI			
12	R	16	0.54	2.3	33	SS			
13	V	16	0.13	2.3	34	STP			
14	V	16	0.27	2.3	35	OHP			
15	V	16	0.54	2.3	36	VIL			
16	SRM	16		2.3	37	HI			
17	R	16	0.54	4.0	38	ET			
18	V	16	0.54	4.0	39	M			
19	SRM			4.0	40	TVS			
20	R	16	0.54	6.5	41	VWP			
21	SRM			6.5					

Appendix D

Checklist of Routine Tasks

UTC Date(s) ______________ Operator(s) _____________________________________

	Record time arriving on duty: ___________ UTC
	Notify Jackson WFO that test has started
	Check Level II recording status in Control Center
	Begin backup Level II recording at KBIX
	Begin Met Watch **- Check that equipment are operating** **- Record “Interesting Observations”** **- Log “Problems”** **- Control VCPs**
	At end of test day, leave the radar in the designated VCP
	Double check Level II recording at the Control Center
	Stop backup Level II recording at KBIX
	Notify Jackson WFO that test has ended
	Write up the storm summary at the bottom of “Interesting Observations” log
	Record time going off duty: ___________ UTC
	File this sheet and log sheets in designated location

Appendix E

Problem Reporting Log

UTC Date(s) ________________ Observer _____________________ Page ____ of ____

Time (UTC)	**Discussion of Problem**

Appendix F

Tape Change Log

Record of 8mm Tape Changes		
BEGIN Date/Time (GMT)	**Script filename**	**END Date/Time (GMT)**

Appendix G

VCP Change Log

Record of VCP Changes		
Date/Time (GMT)	VCP	RPS

Appendix H

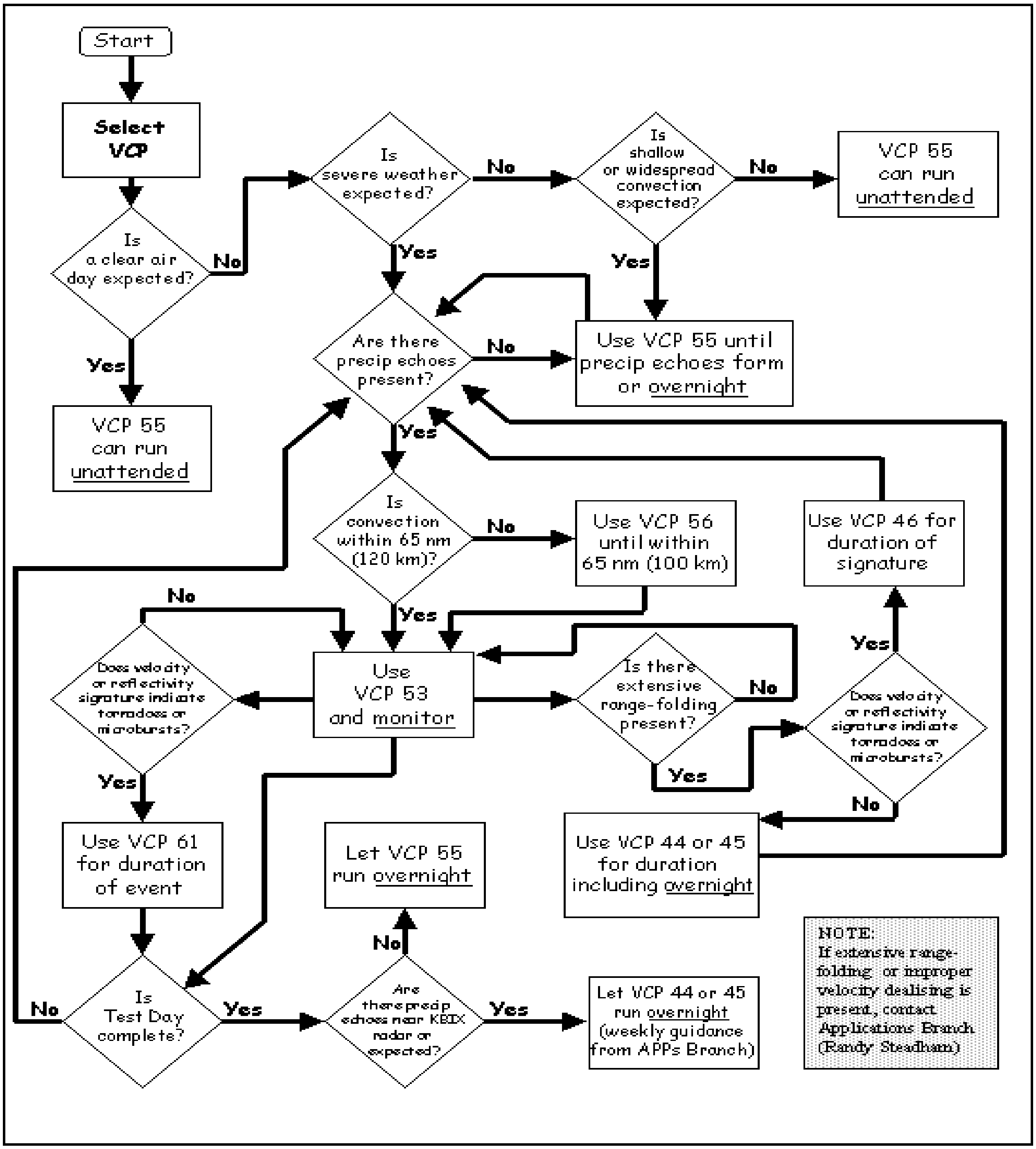
Log of Interesting Observations

UTC Date(s) ________________ **Observer ______________________** **Page ____ of ____**

Time (UTC)	**Interesting Observations**
DAILY SUMMARY	***Synopsis of storm activity*** **(continue on back)**

Appendix I

Decision Process for Selecting a VCP



Appendix J

Number of Volume Scans Collected Using the New VCPs During April 2002

Date (UTC)	44	45	46	53	55	56	57	61	62	77
4 April	24	4		6		4		2		
5 April	143					32		3		
6 April						26				
8 April		1		4		19				
17 April						45				
18 April				55		187				
22 April						67				
23 April						159				
25 April						44				
26 April						284		3		
27 April						293				
28 April						51				
29 April	5			5		32				
30 April	2			18		62				
April Total	**174**	**5**	**0**	**88**	**0**	**1305**	**0**	**8**	**0**	**0**

Number of Volume Scans Collected Using the New VCPs During May 2002

Date (UTC)	44	45	46	53	55	56	57	61	62	77
1 May						224				
2 May						34				
3 May						281				
4 May						292				
5 May						202				
7 May				36						
8 May						14				
9 May						103				
10 May						96				
13 May						34				
14 May						233				
15 May						111				
16 May						209				
17 May	14			4		47				
18 May	7					252				
21 May						96				
22 May						160				
23 May						64		3		
24 May						291				
25 May						20				
28 May						2				41
29 May	2	22		80		2	7	9		118
30 May		39		193				6	1	9
31 May		80	19				73		3	
May Total	**23**	**141**	**19**	**313**	**0**	**2767**	**80**	**18**	**4**	**168**

Number of Volume Scans Collected Using the New VCPs During June 2002

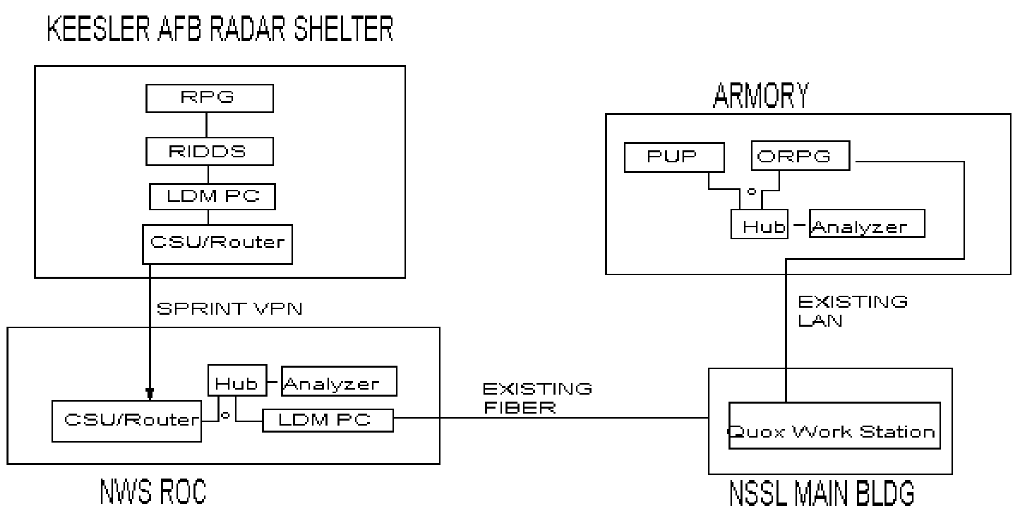
Date (UTC)	44	45	46	53	55	56	57	61	62	77
4 June					2					40
5 June										350
6 June							32			267
7 June		1	2			65	207	1		
11 June						204				
12 June										115
13 June					23					198
18 June										132
19 June										349
20 June		111	5							79
21 June		211			1					13
24 June							124			
25 June	2	2	2	2	2	4	181	2	2	93
26 June			108							182
27 June			436							
28 June			250				25			
June Total	**2**	**325**	**803**	**2**	**28**	**273**	**569**	**3**	**2**	**1818**
Three-Mon Grand Total	**199**	**471**	**822**	**403**	**28**	**4345**	**649**	**29**	**6**	**1986**

Appendix K

Summary of Bandwidth Utilization Measurements During the KBIX Field Test

Prepared by Christina Horvat (26 June 2002)

Overview of Task. Personnel from ROC Engineering conducted a test to determine the impact to communications of new VCPs using the Keesler AFB Radar, April 1 through June 25, 2002. Equipment used for the test are shown in the following figure. ROC Engineering initially monitored and observed only the compressed base data stream for bandwidth utilization analysis (between the KBIX RDA and the NWS ROC LDM PC). Observations began for bandwidth utilization of the product portion of the test (between the Armory ORPG and the PUP), May 24th. Measurements were documented once a day between June 4th and June 25th, for both the base data and product data streams. The most



The data will be compressed before it leaves Keesler, using BZIP2 software installed on the LDM PC. When it arrives at the ROC, bandwidth utilization will be measured before the data is decompressed using the hub to connect the analyzer so as not to interfer with transfer of the data from the router to the LDM PC. The data will be decompressed in the ROC located LDM PC. When the data leaves the LDM PC it will be sent to the NSSL Main Building via an existing fiber optic link. Once it is transferred to the NSSL Quox Work station, it will be distributed to the Armory across an existing local area network (LAN). At the Armory, the data will be used to generate products. Bandwidth utilization will be measured as the products are transferred from the ORPG to the PUP.

significant test results were documented during scattered showers with thunderstorms in the Keesler AFB area. The following is a summary of these significant test results obtained for purposes of determining future impact to NEXRAD communications infrastructure.

VCP	MEASURED COMPRESSED BASE DATA MAXIMUM (kbps)	CALCULATED COMPRESSED BASE DATA MAXIMUM (kbps)
57	38.72	55.32
53	38.35	77.03
56	50.40	55.32
77	64.63	77.03
44	71.01	78.86
45	74.02	78.86
46	64.54	83.81
11	47.54	63.16
21	40.98	36.29
32	12.36	13.93
31	11.76	15.89
55	18.43	19.81
61	71.05	77.61
62	72.58	77.61

Conclusions. Additional testing is required prior to fielding. The test configuration is non-standard from an operational perspective. Hardware, software and telecommunications service used in this test was not final or standard design solution.

1. Additional testing for verification of impact to products is recommended. The RPS lists used during this test are not representative of Archive III, ITWS, WARP, MIAWS, MICROEARTS, or other NEXRAD product users.

Additional testing will require a configuration capable of supporting data rates greater than 14.4 kbps. During the product portion of the test, maximum data rate observations were the norm and the minimum data rate observed for the RPS lists used was 11.0 kbps.

2. Additional testing for verification of impact to base data is recommended. The LDM software and the level of compression implemented during this test is not representative of how Archive II will be modified for central data collection.

3. Additional testing is recommended using the ROC KCRI tested and AWIPS workstation. We are waiting for an approved AWIPS upgrade to make this possible. This is an upgrade to KTLX frame relay ports and PVCs. The two KTLX ports, DCLI 715 and 716 are to be upgraded from 256K to 384K and the two PVCs are to be upgraded from 128K to 256K. MCI WorldCom has been requested to reconfigure the Larscom Access-T DSU/CSU Ports A and B to a 384K port speed and change the PVC speeds from 128K to 256K in the Frame Relay Switch. This will give us a test path with AWIPS to the AWIPS Network Control Facility and to the NWS Telecommunications Gateway.

Anomaly Reporting. One anomaly was observed with intermittent, missing radials. This was resolved by increasing the memory in the LDM machine located at the Keesler radar. Another anomaly was observed with VCPs 61 and 62. After two completed scans, the data stopped flowing to the ORPG. The data was continuing to be generated at the RDA and transferred to NSSL's Quox Workstation. The solution to this problem was to command the radar to use a legacy VCP (such as 11 or 21) before restarting in one of the new VCPs.

Metrics. The following table represents the primary personnel involved with the task and the number of staff-hours each person expended to complete the task.

BW UTILIZATION TEST TIME

Team Member	Planning (staff-hours)	Test Execution (staff-hours)	Evaluation (staff-hours)	Reports (staff-hours)
Christina Horvat Systems Engineering Branch	2	60	4	included in evaluation time
John Heimer Systems Engineering Branch	1	20	4	-
Randy Steadham Radar Applications Branch	10	10	4	-

Deviations. There were deviations due to hardware and telecommunications outages.

Objectives. The test met the following objective:

(1) Determine communications related impacts of new VCPs

Components. The test consisted of monitoring and measuring two data streams and correlating unusual data to weather events. There was limited merit of taking measurements on ORPG-PUP interface due to a bandwidth limitation of 14.4kbps. There was significant benefit derived from taking bandwidth measurements of compressed base data during weather.

Summary. Prior to testing, there was concern that some new VCPs would be implemented that would necessitate system wide communications expansion and modification/upgrade of customer telecommunications services. In fact, it was shown that this is true for some of the new VCPs, (VCPs 44, 45, 46 61 and 62.) This was expected for VCPs 45 and 46. It does not appear that VCP 77, the soonest VCP to be deployed, would drive system wide communications expansion.

Test Procedure. This part of the test effort will include monitoring of the base data stream as output to the Wideband 3 port in the RPG, managed using Local Data Manager (LDM software) and compressed using BZIP2 software. Reference Figure J.1 for graphic details. Although preliminary bandwidth (BW) utilization analysis has been accomplished by Systems Engineering with limited data derived in new VCPs 44, 45, 46, 53, 55, 56, and 61, this is necessary for additional verification of the preliminary results.

This test will also include monitoring of the radar generated products, as they are output to the PUP. This is a new test for ROC Systems engineering. No preliminary BW utilization analysis has been accomplished with the new VCP products. This is necessary for verification of theoretical based calculations.

For the base data portion of the test, a small hub will be installed to connect the router to the analyzer so that the analyzer can observe the data flow without interference. The monitoring will be continuous. Test results will be documented once, every 24 hours. This test will provide ROC and SEC with additional empirical data that will show what impact the new VCPs will have for Archive II data. This is the impact that could eventually have impact on the AWIPS WAN, if the new VCPs are implemented and the base data is approved to be placed on the AWIPS WAN.

For the product portion of the test, a small hub will be installed to connect the ORPG to the analyzer so that the analyzer can observe the data flow without interference. The monitoring will be continuous. Test results will be documented once, every 24 hours. This test will provide ROC and SEC with additional empirical data that will show what impact the new VCPs will have for Archive III data. This is the impact that could eventually have impact on the AWIPS WAN, if the new VCPs are implemented and the associated products placed on the AWIPS WAN for central data collection.